

I claim:

1. A utility line extension and retraction system, the utility line extension and retraction system for enabling a user to selectively extend a utility line for utility line use and retract the utility line for utility line storage, the utility line extension and retraction system comprising:

a plurality of utility line cassettes, each utility line cassette comprising two laterally-spaced, pulley-receiving walls, spacer means intermediate the pulley-receiving walls, an anterior line outlet end, a posterior line inlet end, a stationary pulley assembly adjacent the anterior line outlet end, a traveling pulley assembly intermediate the anterior line outlet end and the posterior line inlet end, and a utility line extending from the posterior line inlet end to the anterior line outlet end, each pulley-receiving wall comprising an inner wall surface, an outer wall surface, and a pulley-receiving groove intermediate the inner wall surface and the outer wall surface, the pulley-receiving grooves cooperatively forming a pulley-receiving track, the pulley-receiving track comprising an inferior track path, a superior track region, and a pulley guide junction intermediate the inferior track path and the superior track region, the superior track region comprising an anterior track path, a posterior track path, and a superior track path intermediate the anterior track path and the posterior track path, the anterior track path, the posterior track path, and the inferior track path intersecting at the pulley guide junction, the superior track path comprising an extended-state rest stop, the extended-state rest stop for braking the utility line when in extended utility line use, the spacer means for maintaining the pulley-receiving walls in laterally spaced relation, the traveling pulley assembly comprising a first

pulley and track-traveling means, the first pulley comprising an inferior pulley region, a central traveling hub aperture, and a first utility line-accepting groove, the central traveling hub aperture having a traveling hub axis, the track traveling means being located in the central traveling hub aperture for enabling the traveling pulley assembly to travel along the pulley-receiving track, the stationary pulley assembly comprising a second pulley and cassette attachment means, the cassette attachment means for rotatably attaching the stationary pulley assembly to the utility line cassette, the second pulley comprising a superior pulley region, a central stationary hub, and a second utility line-accepting groove, the central stationary hub having a stationary hub axis, the utility line comprising an instrument end, an instrument-actuating end, and a utility line length intermediate the instrument end and the instrument-actuating end, the utility line length being cooperatively associated with the first and second utility line-accepting grooves adjacent the inferior and superior pulley regions for imparting motion to the first and second pulleys, the first pulley rotatable about the traveling hub axis, the second pulley rotatable about the stationary hub axis, the instrument-actuating end located adjacent the posterior line inlet end, the instrument end located adjacent the anterior line outlet end, the instrument end cooperatively associated with an instrument, the instrument end being selectively extendable from the anterior line outlet end for utility line use and selectively retractable into the anterior outlet for utility line storage, the traveling pulley assembly located in the inferior track path at a retracted-state rest stop when the instrument end is in a retracted state, the traveling pulley assembly traveling an orderly extension-retraction path when the instrument end is systematically extended

and retracted, the orderly extension-retraction path comprising a series of path steps,
the path steps comprising:

traveling from the retracted-state rest stop to the pulley guide junction along
the inferior track path;

5 traveling from the pulley guide junction to the superior track path along the
anterior track path;

traveling from the anterior track path to the extended-state rest stop along the
superior track path;

10 traveling from the extended-state rest stop to the posterior track path along the
superior track path;

traveling from the superior track path to the pulley guide junction along the
posterior track path; and

15 traveling from the pulley guide junction to the retracted-state rest stop along
the inferior track path, each utility line cassette thus enabling a user to selectively
extend the utility line for utility line use and selectively retract the utility line for
utility line storage.

2. The utility line extension and retraction system of claim 1 wherein the pulley-
receiving track comprises track guide means, the track guide means for directing the
20 traveling pulley assembly into the anterior track path from the pulley guide junction.

3. The utility line extension and retraction system of claim 2 wherein the track guide
means is defined by a track offset adjacent the pulley guide junction, the track offset

comprising pronounced inner wall surface structure for directing the traveling pulley assembly into the anterior track path from the pulley guide junction.

4. The utility line extension and retraction system of claim 1 wherein the track-traveling
5 means comprise a shock-absorbing core and a track-traveling pin, the shock-
absorbing core located in the central traveling hub aperture, the track-traveling pin
comprising laterally opposite groove-engaging ends and a pin length intermediate the
groove-engaging ends, the pin length extending through the shock-absorbing core, the
groove-engaging ends being received in the pulley-receiving track for enabling the
10 traveling pulley assembly to travel along the pulley-receiving track, the shock-
absorbing core for absorbing impact of the inner wall surfaces as the traveling pulley
assembly travels along the orderly extension-retraction path.

5. The utility line extension and retraction system of claim 1 wherein the pulley-
15 receiving walls each comprise stationary pin receiving structure extending from the
inner wall surfaces to the outer wall surfaces, the stationary pin receiving structure
located adjacent the anterior line outlet end, the cassette attachment means
comprising a stationary pin assembly, the stationary pin assembly comprising a
stationary pin, a pair of pin washers, and retaining means, the stationary pin
20 comprising laterally opposite stationary pin ends and a stationary pin length
intermediate the stationary pin ends, the stationary pin length insertable through the
central stationary hub, the stationary pin ends receivable in the stationary pin
receiving structure, the retaining means for retaining the stationary pin ends in the

stationary pin-receiving structure, the pin washers cooperatively associated with the stationary pin ends and the retaining means for relieving friction between the retaining means and the outer wall surfaces.

5 6. The utility line extension and retraction system of claim 1 wherein the second pulley comprises friction-relieving means, the friction relieving means for relieving friction between the second pulley and the inner wall surfaces.

10 7. The utility line extension and retraction system of claim 6 wherein the friction-relieving means is defined by laterally opposite pulley shoulders adjacent the central stationary hub, the pulley shoulders for relieving friction between the second pulley and the inner wall surfaces.

15 8. The utility line extension and retraction system of claim 1 wherein the spacer means comprises anterior spacer structure and posterior spacer structure, the anterior spacer structure comprising an anterior-superior spacer element and an anterior-inferior spacer element, the posterior spacer structure comprising a posterior-superior spacer element and a posterior-inferior spacer element, the anterior-superior spacer element, anterior-inferior spacer element, the posterior-superior spacer element, and the
20 posterior-inferior spacer element each comprising a substantially uniform spacer lateral width, the spacer lateral width being substantially uniform for maintaining the pulley-receiving walls in substantially parallel, laterally spaced relation.

9. The utility line extension and retraction system of claim 8 wherein the posterior-superior spacer element comprises a line-engaging surface, the line-engaging surface for imparting a pulley guide angle to the utility line as the traveling pulley assembly travels through the pulley guide junction, the pulley guide angle for guiding the traveling pulley assembly into the anterior track path from the pulley guide junction, the track guide means thus being defined by the track offset and the pulley guide angle.
10. The utility line extension and retraction system of claim 1 wherein each utility line cassette comprises traveling pulley shock absorbing means, the traveling pulley shock absorbing means for absorbing impact of the first pulley as the traveling pulley assembly travels from the pulley guide junction to the retracted-state rest stop along the inferior track path.
11. The utility line extension and retraction system of claim 10 wherein the traveling pulley shock absorbing means comprise foam padding, the foam padding comprising a foam pad lateral width, the lateral foam lateral pad width being substantially equal in magnitude to the spacer lateral width.
12. The utility line extension and retraction system of claim 1 wherein the utility line extension and retraction system comprises a cassette-enclosing cabinet, the cassette-enclosing cabinet comprising an interior cassette-enclosing chamber, an exterior cabinet surface, cassette-access means, and instrument end outlet means intermediate

the interior cassette-enclosing chamber and the exterior cabinet surface, the cassette-enclosing cabinet enclosing the utility line cassettes, the utility line cassettes arranged in side by side relation, the cassette access means for enabling access to the utility line cassettes, the instrument end outlet means for channeling the instrument ends from the anterior line outlet ends to the exterior cabinet surface, the cassette-enclosing cabinet thus for concealing the utility line cassettes from view.

13. A utility line extension and retraction cassette assembly, the cassette assembly for enabling a user to selectively extend a utility line for utility line use and selectively retract the utility line for utility line storage, the cassette assembly comprising two laterally spaced pulley-receiving walls, spacer means intermediate the pulley-receiving walls, an anterior line outlet end, a posterior line inlet end, a stationary pulley assembly adjacent the anterior line outlet end, a traveling pulley assembly intermediate the anterior line outlet end and the posterior line inlet end, and a utility line extending from the posterior line inlet end to the anterior line outlet end, each pulley-receiving wall comprising an inner wall surface, an outer wall surface, and a pulley-receiving groove intermediate the inner wall surface and the outer wall surface, the pulley-receiving grooves cooperatively forming a pulley-receiving track, the pulley-receiving track comprising an inferior track path, a superior track region, and a pulley guide junction intermediate the inferior track path and the superior track region, the superior track region comprising an anterior track path, a posterior track path, and a superior track path intermediate the anterior track path and the posterior track path, the anterior track path, the posterior track path, and the inferior track path

intersecting at the pulley guide junction, the superior track path comprising an extended-state rest stop, the extended-state rest stop for braking the utility line when in extended utility line use, the spacer means for maintaining the pulley-receiving walls in laterally spaced relation, the traveling pulley assembly comprising a first pulley and track-traveling means, the first pulley comprising an inferior pulley region, a central traveling hub aperture, and a first utility line-accepting groove, the central traveling hub aperture having a traveling hub axis, the track traveling means located in the central traveling hub aperture for enabling the traveling pulley assembly to travel along the pulley-receiving track, the stationary pulley assembly comprising a second pulley and cassette attachment means, the cassette attachment means for rotatably attaching the stationary pulley assembly to the utility line cassette, the second pulley comprising a superior pulley region, a central stationary hub, and a second utility line-accepting groove, the central stationary hub having a stationary hub axis, the utility line comprising an instrument end, an instrument-actuating end, and a utility line length intermediate the instrument end and the instrument-actuating end, the utility line length being cooperatively associated with the first and second utility line-accepting grooves adjacent the inferior and superior pulley regions for imparting motion to the first and second pulleys, the first pulley rotatable about the traveling hub axis, the second pulley rotatable about the stationary hub axis, the instrument-actuating end located adjacent the posterior line inlet end, the instrument end located adjacent the anterior line outlet end, the instrument end being selectively extendable from the anterior line outlet end for utility line use and selectively retractable into the anterior outlet for utility line storage, the traveling pulley

assembly located in the inferior track path at a retracted-state rest stop when the instrument end is in a retracted state, the traveling pulley assembly traveling an orderly extension-retraction path when the instrument end is systematically extended and retracted, the orderly extension-retraction path comprising a series of path steps, the path steps comprising:

traveling from the retracted-state rest stop to the pulley guide junction along the inferior track path;

traveling from the pulley guide junction to the superior track path along the anterior track path;

traveling from the anterior track path to the extended-state rest stop along the superior track path;

traveling from the extended-state rest stop to the posterior track path along the superior track path;

traveling from the superior track path to the pulley guide junction along the posterior track path; and

traveling from the pulley guide junction to the retracted-state rest stop along the inferior track path, the cassette assembly thus enabling a user to selectively extend the utility line for utility line use and selectively retract the utility line for utility line storage.

14. The cassette assembly of claim 13 wherein the pulley-receiving track comprises track guide means, the track guide means for directing the traveling pulley assembly into the anterior track path from the pulley guide junction.

15. The cassette assembly of claim 14 wherein the track guide means is defined by a track offset adjacent the pulley guide junction, the track offset comprising pronounced inner wall surface structure for directing the traveling pulley assembly into the anterior track path from the pulley guide junction.

16. The cassette assembly of claim 13 wherein the track-traveling means comprise a shock-absorbing core and a track-traveling pin, the shock-absorbing core located in the central traveling hub aperture, the track-traveling pin comprising laterally opposite groove-engaging ends and a pin length intermediate the groove-engaging ends, the pin length extending through the shock-absorbing core, the groove-engaging ends being received in the pulley-receiving track for enabling the traveling pulley assembly to travel along the pulley-receiving track, the shock-absorbing core for absorbing impact of the inner wall surfaces as the traveling pulley assembly travels along the orderly extension-retraction path.

17. The cassette assembly of claim 13 wherein the pulley-receiving walls each comprise stationary pin receiving structure extending from the inner wall surfaces to the outer wall surfaces, the stationary pin receiving structure located adjacent the anterior line outlet end, the cassette attachment means comprising a stationary pin assembly, the stationary pin assembly comprising a stationary pin, a pair of pin washers, and retaining means, the stationary pin comprising laterally opposite stationary pin ends and a stationary pin length intermediate the stationary pin ends, the stationary pin

length insertable through the central stationary hub, the stationary pin ends receivable
in the stationary pin receiving structure, the retaining means for retaining the
stationary pin ends in the stationary pin-receiving structure, the stationary pin washers
cooperatively associated with the stationary pin ends and the retaining means for
5 relieving friction between the retaining means and the outer wall surfaces.

18. The cassette assembly of claim 13 wherein the second pulley comprises friction-
relieving means, the friction relieving means for relieving friction between the second
pulley and the inner wall surfaces.

10

19. The cassette assembly of claim 18 wherein the friction-relieving means is defined by
laterally opposite pulley shoulders adjacent the central stationary hub, the pulley
shoulders for relieving friction between the second pulley and the inner wall surfaces.

15 20. The cassette assembly of claim 13 wherein the spacer means comprises anterior
spacer structure and posterior spacer structure, the anterior spacer structure
comprising an anterior-superior spacer element and an anterior-inferior spacer
element, the posterior spacer structure comprising a posterior-superior spacer element
and a posterior-inferior spacer element, the anterior-superior spacer element, anterior-
20 inferior spacer element, the posterior-superior spacer element, and the posterior-
inferior spacer element each comprising a substantially uniform spacer lateral width,
the spacer lateral width being substantially uniform for maintaining the pulley-
receiving walls in substantially parallel, laterally spaced relation.

21. The cassette assembly of claim 20 wherein the posterior-superior spacer element comprises a line-engaging surface, the line-engaging surface for imparting a pulley guide angle to the utility line as the traveling pulley assembly travels through the pulley guide junction, the pulley guide angle for guiding the traveling pulley assembly into the anterior track path from the pulley guide junction, the track guide means thus being defined by the track offset and the pulley guide angle.

22. The cassette assembly of claim 13 wherein the cassette assembly comprises traveling pulley shock absorbing means, the traveling pulley shock absorbing means for absorbing impact of the first pulley as the traveling pulley assembly travels from the pulley guide junction to the retracted-state rest stop along the inferior track path.

23. The cassette assembly of claim 22 wherein the traveling pulley shock absorbing means comprise foam padding, the foam padding comprising a foam pad lateral width, the lateral foam lateral pad width being substantially equal in magnitude to the spacer lateral width.

24. The cassette assembly of claim 13 wherein the cassette assembly comprises a cassette-enclosing cabinet, the cassette-enclosing cabinet comprising an interior cassette-enclosing chamber, an exterior cabinet surface, cassette-access means, and instrument end outlet means, the cassette-enclosing cabinet enclosing the cassette assembly, the cassette access means for enabling access to the cassette assembly, the

instrument end outlet means for channeling the instrument end from the anterior line outlet end to the exterior cabinet surface, the cassette-enclosing cabinet thus for concealing the cassette assembly from view.

- 5 25. A utility line extension and retraction cassette assembly, the cassette assembly for enabling a user to selectively extend a utility line for utility line use and selectively retract the utility line for utility line storage, the cassette assembly comprising two laterally spaced pulley-receiving walls, an anterior line outlet end, a posterior line inlet end, a traveling pulley assembly, and a utility line extending from the posterior
- 10 line inlet end to the anterior line outlet end, each pulley-receiving wall comprising an inner wall surface and pulley-receiving structure, the pulley-receiving structure being formed in the inner wall surfaces, the pulley-receiving structure cooperatively forming a pulley-receiving track, the pulley-receiving track comprising a superior track region and a pulley guide junction, the superior track region comprising an
- 15 ascension track path, a descension track path, and an extended-state rest stop intermediate the ascension track path and the descension track path, the ascension track path and the descension track path intersecting at the pulley guide junction, the utility line comprising a first line end, a second line end, and a line length intermediate the first and second line ends, the line length being cooperatively
- 20 associated with the traveling pulley assembly for imparting motion thereto, the first line end being selectively extendable from the anterior line outlet end for utility line use and selectively retractable into the anterior outlet for utility line storage.

26. The cassette assembly of claim 25 wherein the traveling pulley assembly travels an orderly extension-retraction path when the first line end is systematically extended and retracted, the orderly extension-retraction path comprising a series of path steps, the path steps comprising traveling from the pulley guide junction to the extended-
5 state rest stop along the ascension track path, and traveling from the extended-state rest stop to the pulley guide junction along the descension track path.

27. The cassette assembly of claim 25 wherein the cassette assembly comprises spacer means intermediate the pulley-receiving walls, the spacer means for maintaining the
10 pulley-receiving walls in laterally spaced relation.

28. The cassette assembly of claim 25 wherein the pulley guide junction comprises track guide means, the track guide means for directing the traveling pulley assembly into the ascension track path from pulley guide junction.

15

29. The cassette assembly of claim 25 wherein the track-traveling means comprise a shock-absorbing core and a track-traveling pin, the shock-absorbing core forming a central traveling hub of the traveling pulley assembly, the track-traveling pin comprising laterally opposite groove-engaging ends and a pin length intermediate the
20 groove-engaging ends, the pin length extending through the shock-absorbing core, the groove-engaging ends being received in the pulley-receiving track for enabling the traveling pulley assembly to travel along the pulley-receiving track, the shock-

absorbing core for absorbing impact of the inner wall surfaces as the traveling pulley assembly travels along the orderly extension-retraction path.

30. The cassette assembly of claim 25 wherein the cassette assembly comprises friction-relieving means adjacent the anterior line outlet end, the friction relieving means for relieving friction intermediate the utility line and the anterior line outlet end.

31. The cassette assembly of claim 30 wherein the friction-relieving means is defined by a stationary pulley assembly, the stationary pulley assembly comprising a rotatable pulley and cassette attachment means, the cassette attachment means for rotatably attaching the rotatable pulley to the cassette assembly intermediate the inner wall surfaces, the rotatable pulley comprising laterally opposite pulley shoulders, the pulley shoulders for relieving friction between the rotatable pulley and the inner wall surfaces.

15

32. The cassette assembly of claim 27 wherein the spacer means comprises a posterior-superior spacer element, the posterior-superior spacer element comprising a spacer lateral width and line-engaging surface, the spacer lateral width for maintaining the pulley-receiving walls in laterally spaced relation, the line-engaging surface for imparting a pulley guide angle to the utility line as the traveling pulley assembly travels through the pulley guide junction, the pulley guide angle for guiding the traveling pulley assembly into the ascension track path from the pulley guide

20

junction, the track guide means thus being defined by the track offset and the pulley guide angle.

33. The cassette assembly of claim 26 wherein the cassette assembly comprises traveling
5 pulley shock absorbing means, the traveling pulley shock absorbing means for
absorbing impact of the traveling pulley assembly as the traveling pulley assembly
travels along the orderly extension-retraction path.

34. The cassette assembly of claim 33 wherein the traveling pulley shock absorbing
10 means is defined by a select shock absorbing structure, the select shock-absorbing
structure being selected from the group consisting of the shock-absorbing core and
impact-resistant foam padding, the shock-absorbing core for absorbing impact of the
inner wall surfaces as the traveling pulley assembly travels along the orderly
extension-retraction path, the foam padding for absorbing impact of the traveling
15 pulley assembly as the traveling pulley assembly travels from the descension track
path through the pulley guide junction.

35. The cassette assembly of claim 25 wherein the cassette assembly comprises a cassette
assembly-enclosing cabinet, the cassette assembly -enclosing cabinet comprising an
20 interior cassette assembly-enclosing chamber, an exterior cabinet surface, cassette
assembly-access means, and first line end outlet means, the cassette assembly-
enclosing cabinet enclosing the cassette assembly, the cassette assembly access
means for enabling access to the cassette assembly, the first line end outlet means for

channeling the first line end from the anterior line outlet end to the exterior cabinet surface, the cassette assembly-enclosing cabinet thus for concealing the cassette assembly from view.